

A COMPUTER METHOD FOR PRODUCING DOT DISTRIBUTION MAPS

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ABSTRACT

A method of producing dot distribution maps automatically from a database file using widely available computer software and public domain mapping software is described. Two sample maps are provided.

Key words: atlas, distribution map, MicroCAM, New England, WordPerfect 6.0

While preparing the first installment of an atlas of the vascular plants of New England, a method was developed using various computer software programs to produce dot distribution maps automatically from a database file. This note described the methodology in general terms (but with references to specific software programs) and provides two sample distribution maps produced with this method. More technical details will appear in the first installment of the New England atlas of vascular plants, which is in preparation.

Three computer software programs were used. The mapping software used to produce a customized map of New England with county borders was MicroCAM (Version 3.1). This software, which is for computers that use MS-DOS (most versions), was developed by Dr. Scott A. Loomer (now a professor of geography at the U.S. Military Academy at West Point). Since it is an adaptation of a federally funded mainframe mapping program (CAM), it is in the public domain. It may be obtained at nominal cost from:

Microcomputer Specialty Group of the Assoc.
of American Geographers
% Department of Geography
Indiana University of Pennsylvania
Indiana, PA 15705-1087

The MicroCAM software includes maps of countries, U.S. states, county boundaries, Canadian provinces, coastlines, major rivers, major lakes and major islands derived from World Data Bank II and U.S. Census Bureau boundary files.

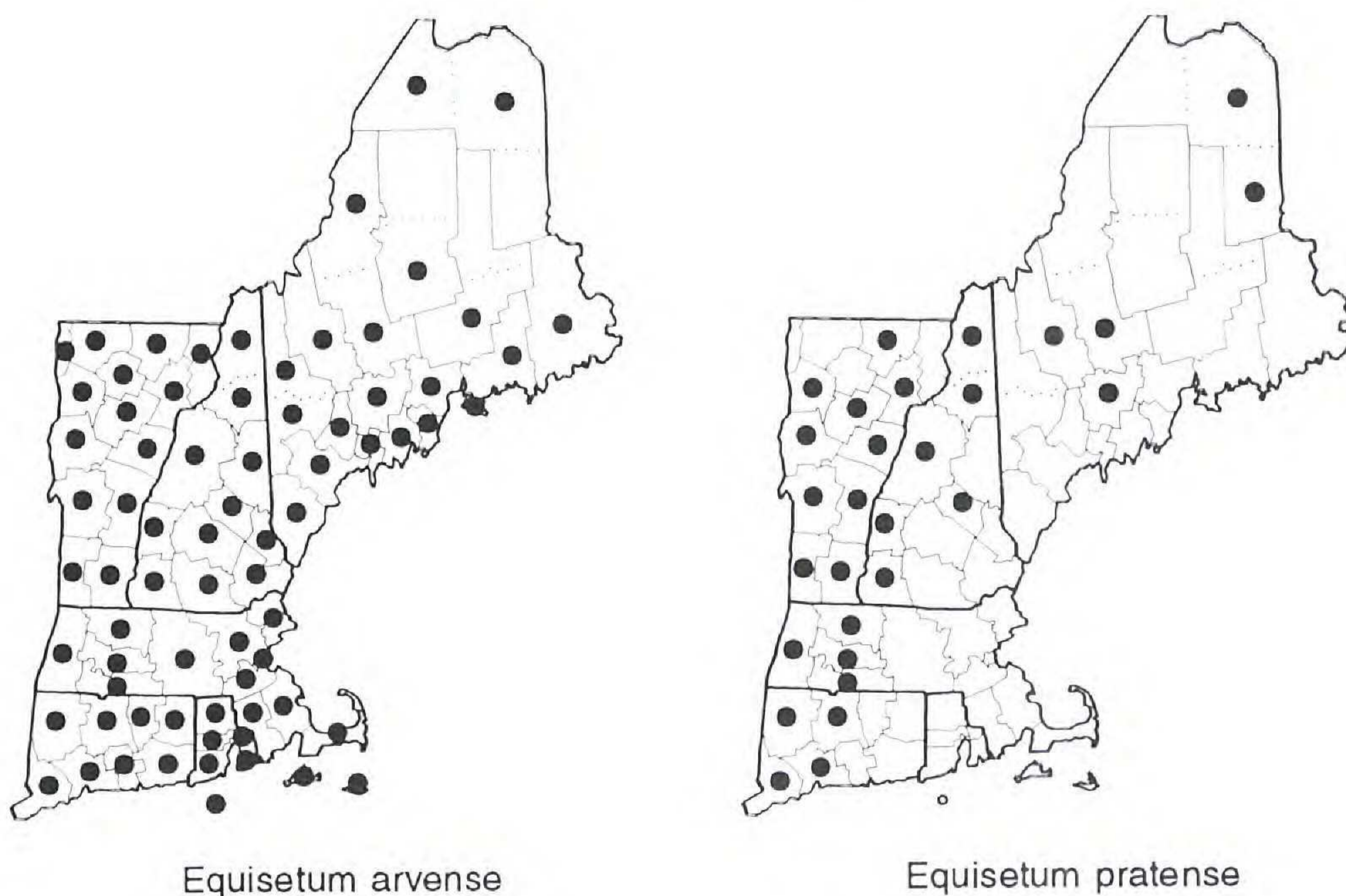


Figure 1. Sample distribution maps produced using the method of this note.

The maps created with MicroCAM can be saved in files in a variety of formats. One of these is Hewlett-Packard Language (HPGL), a standard vector graphics format. The HPGL map files can be imported into WordPerfect 6.0 image files which can then be manipulated. Maps from other mapping programs that can be imported into WordPerfect 6.0 can also be used in this method.

The database software used was Paradox (version 4.0 for DOS) produced by Borland International, Inc. However, any database software that can export its files into ASCII delimited text files (or files of other formats that will be recognized by WordPerfect 6.0 as data files) can be used.

The word processing software WordPerfect 6.0 (product of WordPerfect Corporation) is probably the most vital element of the method. Its ability to manipulate graphics images inside graphics boxes (rectangular areas embedded in a page of text) and its flexibility in allowing the printing of superimposed graphics boxes are critical to the viability of this method. Also, the availability of a scalable, sharp dot in the WordPerfect character sets and a Hewlett-Packard laserjet printer are important. Dots (circular disks) printed by dot matrix printers do not have perfectly circular margins. Similarly, dots produced by some graphics soft-

ware (MicroCAM, for example) are actually many-sided polygons and can be recognized as such.

The basic idea of the method is to perform a merge between a database file containing distribution records and a form file consisting of superimposed graphics boxes. One graphics box contains the outline map (hereafter called a map box). Two other graphic boxes, superimposed over the map box, place dots at specific locations within the box (hereafter called a dot box), depending on the contents of the database fields. A merge is the process that businesses use to produce individualized letters from a customer list (database file) and a form letter (form file).

For the atlas, each taxon is a record in the database file. Each record consists of fields for each component of the scientific name and for each county in New England. Additional fields are provided for the arbitrary subdivisions of some larger counties and for Mt. Desert, Maine and Block Island, Rhode Island. If a herbarium record exists for the taxon in a given county, a letter code for the particular herbarium appears in the field for the county. Otherwise, the given county field is empty. Most of the herbarium records (perhaps 85% to 90%) in the database file are based upon specimens in the New England Botanical Club herbarium.

A map of New England was created using MicroCAM and saved in a file in HPGL format. Then a graphics box (the map box) was designed in WordPerfect 6.0 with the New England map file named as the contents. The image was rotated, shifted and scaled to fit neatly in the graphics box using the image editing capabilities of WordPerfect 6.0. This map box was then saved as a file.

A WordPerfect macro was then created for each New England county. A macro is a sequence of keystrokes that can be executed by pressing one (or a few) preassigned key(s). Each macro created for this method places a dot of a given size at a specific position inside a graphics box (dot box) which is the same size as the map box. The position of the dot is chosen to correspond to the position of the given county in the map box when the dot box is superimposed over the map box. The advantage of defining the macros with respect to the margins of the dot box is that the box may be placed at any position on a page (along with the associated map box) without the need to create a new set of macros.

The form file consists of at least one set of three superimposed graphics boxes. The lowermost is the map box. The next box above (a dot box) contains a set of merge commands that execute

the macros for the counties in Maine, New Hampshire and Vermont for each corresponding nonempty county field in the database file. The uppermost box (a dot box) contains a set of merge commands for the counties in Massachusetts, Rhode Island and Connecticut and a set that produces a caption (the name of the taxon). Two dot boxes were required to hold the merge commands for the counties of New England since one graphics box (of the size used) would not accept the entire set of merge commands. Also, the contents of a graphics box in WordPerfect 6.0 must either be a graphics image or text. There is limited ability to add text to a graphics box containing a graphics image. Since the dots are considered text, it was not possible to place the required merge commands directly into the map box.

Figure 1 is an example of two distribution maps produced using this method with actual data for *Equisetum pratense* Ehrhart and *Equisetum arvense* L. The map was created and imported into WordPerfect 6.0 on a Dell 386 notebook computer. The merge was executed on a Dell 386 desktop computer. The printer used was a Hewlett-Packard Laserjet 4.

This author is unaware of any single, inexpensive software package that accomplishes the results of the method described here. A sophisticated Geographic Information System (GIS) type of software package, PC Arc/Info, made by Environmental Systems Research Institute, no doubt can accomplish the results of this method (except possibly the sharp dots), but its capabilities far exceed what is necessary. Other software programs for IBM compatible computers that might be capable of achieving the results of the method described here are Atlas GIS (Strategic Mapping Inc.), GIS Plus (Caliper Corp.), and MapInfo (MapInfo Corp.). These packages (including PC Arc/Info) are somewhat expensive. Readers interested in geographic data systems for plants should consult the electronic article, "Design Criteria for a Plant Geographic Information System" by Jim Sullivan published in "Flora Online" (Issue #18, Sept. 13, 1988, Text file 018GIS10.TXT, 53,805 bytes), an electronic publication of TAXACOM.

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